

WHAT IS CLAIMED IS:

1. An OLED device for producing white light which more effectively matches the response of multicolor filters in an OLED device, comprising:

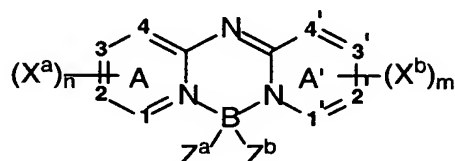
- a) an anode and a spaced cathode;
- b) an organic EL element disposed between the anode and cathode having at least two different dopants for collectively emitting white light;
- c) a color filter array disposed over the EL element and including at least three separate filters having bandpass spectra for passing red, green, and blue light, respectively, in response to white light to produce preselected color outputs; and
- d) the composition of one or more of the dopants being selected to change the spectrum of the white light to be compatible with the spectrum of the color filters by having peak responses in the white light spectrum corresponding to the bandpass spectra of the red and blue color filters so that the white light more effectively matches the responses of the color filters.

2. The OLED device of claim 1 wherein the organic EL element includes a first layer having a dopant for substantially emitting light in the blue region and less light in the green region, and a second layer having a dopant for substantially emitting light in the red region and less light in the green region of the spectrum.

3. The OLED device of claim 1 wherein the bandpass spectrum of the red color filter is from 605 nm to 700 nm.

4. The OLED device of claim 1 wherein the bandpass spectrum of the green color filter is from 495 nm to 555 nm.

5. The OLED device of claim 1 wherein the bandpass spectrum of the blue color filter is from 435 nm to 480 nm.
6. The OLED device of claim 1 wherein the organic EL element includes:
 - i) a hole-transporting layer disposed over the anode;
 - ii) a blue light-emitting layer including a host material and a light-emitting blue dopant disposed over the hole-transporting layer;
 - iii) an electron-transporting layer disposed over the blue light-emitting layer; and
 - iv) the hole-transporting layer including a light-emitting yellow dopant and a light-emitting red dopant.
7. The OLED device of claim 6 wherein the host material in the blue light-emitting layer includes an anthracene derivative having hydrocarbon or substituted-hydrocarbon substituents at the 9 and 10 positions.
8. The OLED device of claim 6 wherein the light-emitting blue dopant includes perylene or a derivative of perylene.
9. The OLED device of claim 6 wherein the light-emitting blue dopant includes a blue-emitting derivative of a distyrylbenzene or a distyrylbiphenyl.
10. The OLED device of claim 6 wherein the light-emitting blue dopant includes a compound of the structure



wherein:

A and A' represent independent azine ring systems corresponding to 6-membered aromatic ring systems containing at least one nitrogen;

(X^a)_n and (X^b)_m represent one or more independently selected substituents and include acyclic substituents or are joined to form a ring fused to A or A';

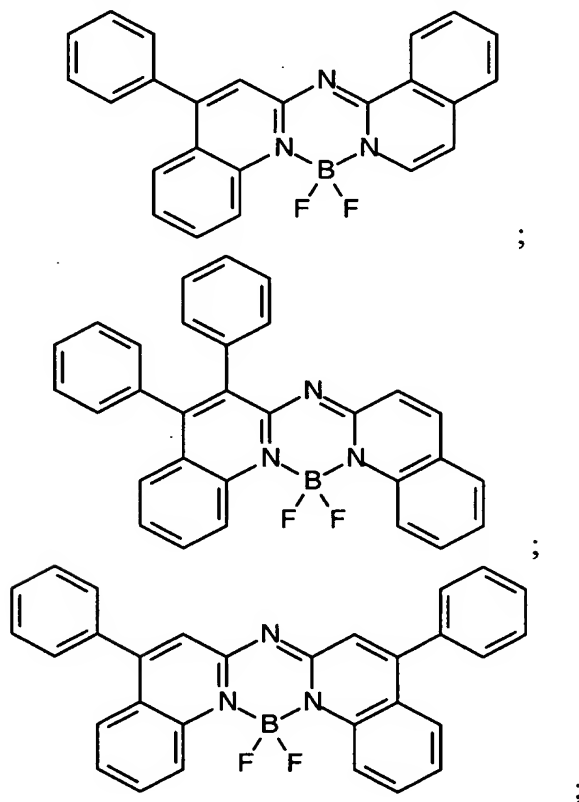
m and n are independently 0 to 4;

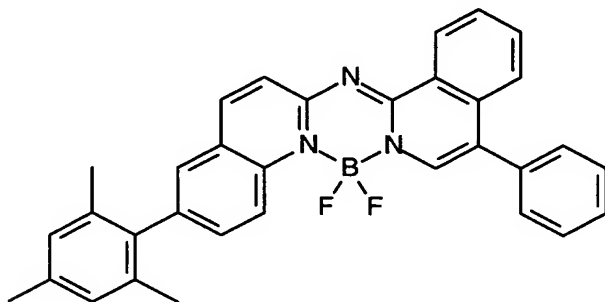
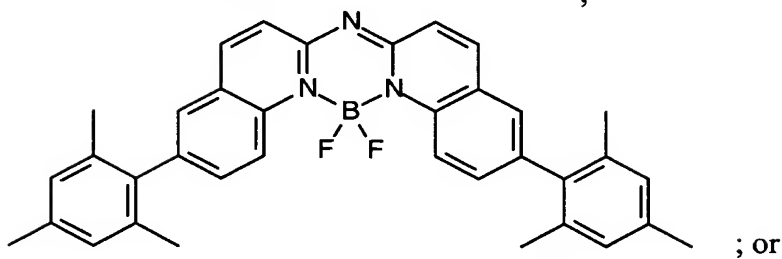
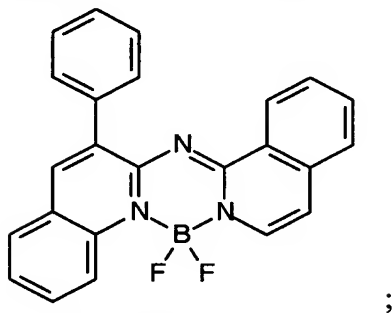
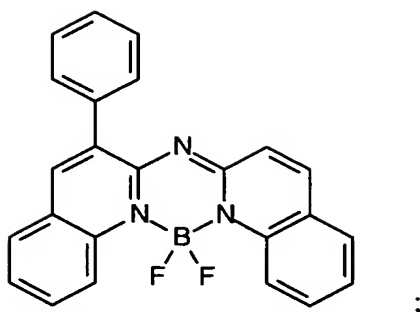
Z^a and Z^b are independently selected substituents;

1, 2, 3, 4, 1', 2', 3', and 4' are independently selected as either carbon or nitrogen atoms; and

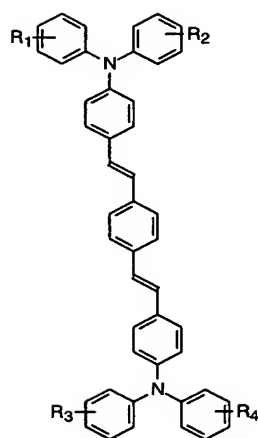
wherein X^a, X^b, Z^a, and Z^b, 1, 2, 3, 4, 1', 2', 3', and 4' are selected to provide blue luminescence.

11. The OLED device of claim 6 wherein the light-emitting blue dopant includes a compound of the structure:

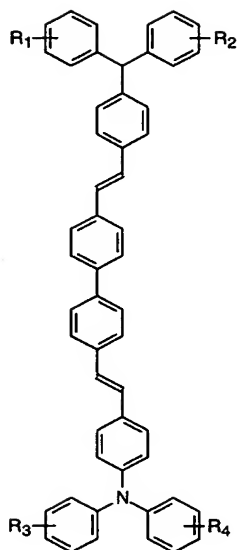




12. The OLED device of claim 6 wherein the light-emitting blue dopant includes a compound of the structure:

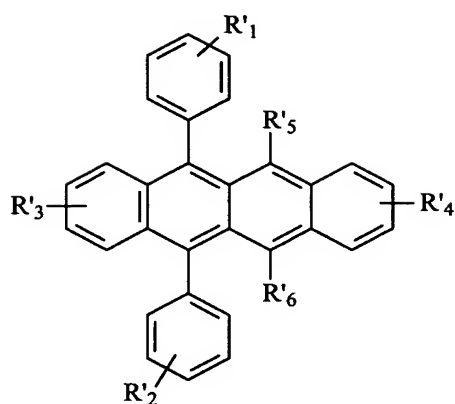


; or

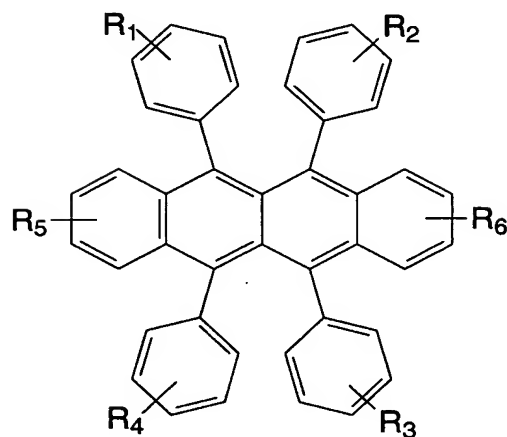


wherein R₁ – R₄ can be the same or different, and individually represent one or more substituents such as alkyl, aryl, fused aryl, halo, or cyano.

13. The OLED device of claim 6 wherein the light-emitting yellow dopant includes a compound of the following structure:



; or



wherein $R_1 - R_6$ represent one or more substituents on each ring and where each substituent is individually selected from one of the following:

Category 1: hydrogen, or alkyl of from 1 to 24 carbon atoms;

Category 2: aryl or substituted aryl of from 5 to 20 carbon atoms;

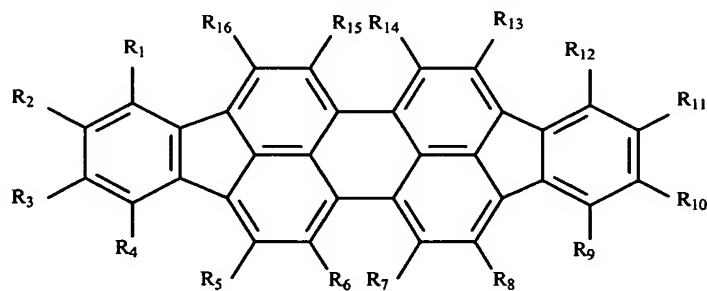
Category 3: hydrocarbon containing 4 to 24 carbon atoms, completing a fused aromatic ring or ring system;

Category 4: heteroaryl or substituted heteroaryl of from 5 to 24 carbon atoms such as thiazolyl, furyl, thienyl, pyridyl, quinolinyl or other heterocyclic systems, which are bonded via a single bond, or complete a fused heteroaromatic ring system;

Category 5: alkoxyamino, alkylamino, or arylamino of from 1 to 24 carbon atoms; or

Category 6: fluoro, chloro, bromo or cyano.

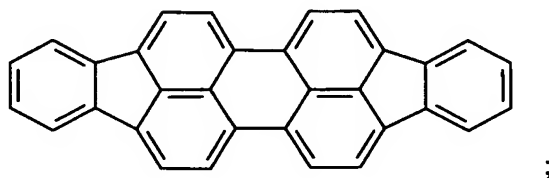
14. The OLED device of claim 6 wherein the light-emitting red dopant includes a diindenoperylene compound of the following structure:



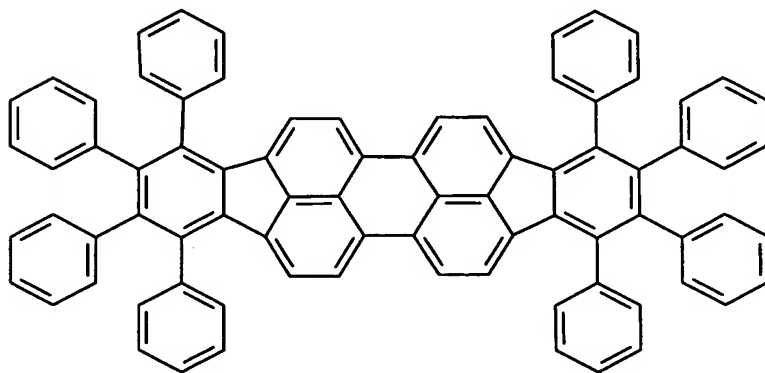
wherein:

R_1 - R_{16} are independently selected as hydro or substituents that provide red luminescence.

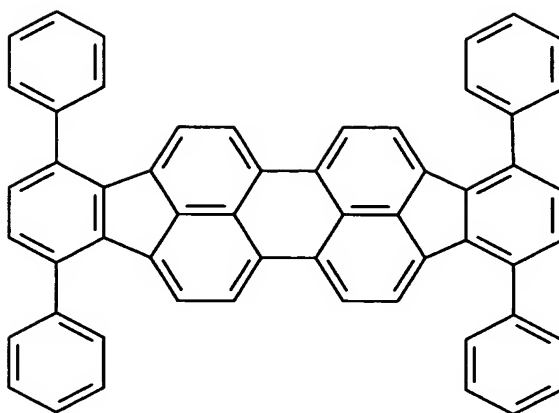
15. The OLED device of claim 6 wherein the light-emitting red dopant includes:



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; or



16. The OLED device of claim 6 further including a layer having a light-emitting green dopant which produces green light that substantially matches the color response of the green color filter without causing degradation of the red and blue colors.